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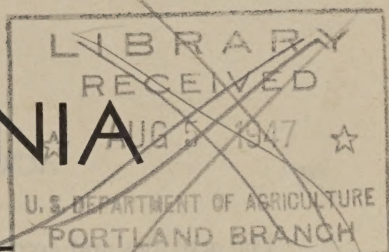
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FARM FORESTRY

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IN

CALIFORNIA



1940-1945



Prepared by

SOIL CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

Published by

DIVISION OF FORESTRY
CALIFORNIA DEPARTMENT OF NATURAL RESOURCES

ACKNOWLEDGMENTS

The activities and accomplishments reported herein are a result of the cooperative efforts of the many farmers who were willing to try something new, and the employees of the State and Federal agencies engaged in developing and helping to demonstrate ways of doing a good job of farm woodland management.

Special credit is due the Soil Conservation Service Farm Foresters, Richard Mors and Jack Reveal of Sonoma County; Mace Lumsden and Earl Hodgkins of El Dorado County. Also State Rangers LeRoy Neil and Evan Joy of Sonoma County and Willard Austin, Malcom Dixon and William Nevins of El Dorado County, contributed materially to field work. Much helpful advice was given by representatives of the Forest Service and the University of California, Department of Forestry.

Cover Illustration—

*Second-growth redwood and Douglas fir on farms near the Russian River
in Sonoma County, California*

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FARM FORESTRY IN CALIFORNIA

1940-1945

UNDER THE

COOPERATIVE FARM FORESTRY ACT

INTRODUCTION

Accomplishments in the two cooperative farm forestry demonstration projects in California are of interest to every California farmer and landowner who has woodland on his property. The values of woodland products, as a crop, usually are not so well known or appreciated as are the values from other farm crops. These cooperative farm forestry projects were established to demonstrate the management and use of farm woodlands and to show the incomes which might be derived from their use and management. Farmers and advisors to farmers will, therefore, be interested in the return for woodland crops and labor as shown by the results on these two projects.

ESTABLISHMENT AND OBJECTIVES

Cooperative farm forestry demonstration projects were established in El Dorado and Sonoma Counties in California in April and September, 1940. They were established under authority of the Cooperative Farm Forestry, or Norris-Doxey Act. A plan for farm forestry for the State of California was prepared and approved in September, 1939, by representatives of the University of California Extension Service, State Division of Forestry, Forest Service, and Soil Conservation Service. Following the initial recommendations in the State plan, intensive farm forestry demonstration projects were established by the Soil Conservation Service, United States Department of Agriculture, in cooperation with the State Division of Forestry, in El Dorado County as representing the second-growth Ponderosa pine zone, and in Sonoma County as representing the second-growth redwood and Douglas fir zone.

As stated in the act, the objectives were: "* * * to aid agriculture, increase farm forest income, conserve water resources, increase employment and in other ways advance the general welfare and improve living conditions on the farm * * *; to advise farmers regarding the establishment, protection and management of farm forests and forest and shrub plantations and the harvesting, utilization and marketing of the products thereof; * * *."

In practice, the aims of those charged with helping farmers install this program were to: (1) Use the land for maximum use for continuous production (i. e., by growing trees on lands less adapted to cultivation and better



Illustration 1. An aerial view of a part of El Dorado County, California, showing how woodland is interspersed with cultivated lands in individual ownerships.

This is characteristic of many farm units.

suited to growing a permanent crop of trees). (2) Keep those lands productive (i. e., by growing as many trees of the best quality as the land will support). (3) Get the greatest return to the owner from his woods crop and his labor used in growing, harvesting and marketing that crop.



Illustration 2. Farm woodlands and cultivated lands are intermingled in the Ponderosa pine belt, as represented here in El Dorado County, California

LOCATION AND SETTING

The El Dorado Farm Forestry Demonstration Project covers the central third of El Dorado County lying east of State Highway 49. More than 500 farms, having about 75,000 acres of woodland, are included within the project boundaries. These farms and woodlands were considered representative of the second-growth Ponderosa pine zone on the western slope of the Sierras. Therefore, results from woodland management activities in this area would be similar to results that could be secured in most of the second-growth pine belt. The project lies between elevations of 1,600 and 3,500 feet. The predominant species is Ponderosa pine. Associated species include Douglas fir, sugar pine, white pine, incense cedar, black oak, and live oak. The woodland sites vary from the poorest to the best, and from inaccessible to readily accessible—thus providing a wide range of conditions. Intensive agriculture varies from small part-time farms to large commercial pear orchards. The character of the farm lands of El Dorado County, as to topography and use, is shown in Illustrations 1 and 2.

The Sonoma Farm Forestry Demonstration Project in Sonoma County was first set up to cover the southwestern coastal third of the county and in December, 1942, was expanded to include the northwestern coastal third of the county, thereby taking in all of Sonoma County west of U. S. Highway 101. On the expanded base, it enclosed some 700 farms with about 100,000 acres of woodland on them. Other farms without woodland and other timber



Illustration 3. An aerial view of a part of Sonoma County showing the distribution of woodlands and other lands on farms in the Sonoma Forestry Project

covered lands were also enclosed within the project area. It was considered representative of the southern redwood belt. From the north to the south, predominate features and conditions are coastal mountains of virgin and cut-over, or second-growth redwood and Douglas fir, stands of native hardwoods and brush, thinly wooded rolling hills interspersed with developed valleys and, in the more southern part, formerly treeless coastal hills spotted with eucalyptus plantations. Valley agriculture is intensive. Away from the coast, it consists largely of orchards, vineyards and hop-fields. Toward the coast, poultry raising and dairying predominate, and in the more heavily forested hills extensive sheep and cattle raising predominate.

The coniferous forests which cover the northern third of the project are about three-fourths redwood and one-fourth Douglas fir. About a fifth of the redwood is virgin and the remainder cut-over and second-growth, up to 80 years old. Other tree species include, principally, tan-bark oak, California laurel, madrone, oaks and pines. The interspersed character of the farms and farm woodlands, and the general topography of Sonoma County are shown in Illustration 3 and the cover illustration.



Illustration 4. Ponderosa pine with reproduction which came in during period of protection from burning. This area had been burned annually for 14 years, then unburned for seven and then burned for the last eight years. There was no reproduction during period when burned. The youngest trees became established during the period of no burning. El Dorado County, California.

PROGRAM

The program of the farm forestry projects covered four major fields of activity: (1) An educational program to emphasize the crop possibilities of farm woodlands; (2) the location and development of markets for woodland products, particularly for items not in general demand; (3) the preparation of individual farm land-use and woodland management plans; and (4) technical forestry assistance for farmers who did not get the more complete demonstration farm and woodland cropping plans.

The educational program was designed to teach local farmers that the farm woods is a growing crop similar to many other crops, that it can be helped by the right kind of management, and can be harvested annually or periodically, thus providing for a continuous crop. Under leadership of the county farm advisor, use was made of the radio, local newspapers, the showing of films and giving talks at group meetings, window displays, and personal calls to owners of farm woodland.

In the development of the educational program it was found that many farmers thought of trees as a fixed resource, profitable only when sold as



Illustration 5. Hillside where Douglas fir had been girdled and burned about 10 years ago to develop grass rangeland. Development of grass range is successful only on warm exposures, deep soils and gentle slopes of less than 20 per cent. Note that severe burning has not occurred since the clearing fire. Sonoma County, California, note also Illustration 6, page 11.

saw logs; that when not suitable for saw logs trees should be disposed of in any way possible so that the land can be used for grass or cultivated crops. This idea is probably a heritage or tradition from pioneer days when clearing any forest land was a virtue. It is a common opinion of some farmer owners of woodland that the trees are only taking up space that might grow grass. Good woodland practices were not new—they had been preached before—but the farm forestry projects attempted to bring them closer to the local farmers by helping them apply the practices in the farm woods.

Another factor in the program of the farm forestry projects is the use of fire. Fire was used widely to clear land of timber for cultivation, to reduce fire hazards, to remove brush so that more grass could grow. It was customary to burn the woodlands during the late spring or early fall whenever there was enough litter to carry a fire. This is often called light annual burning. Its purpose was to keep the woods open and encourage the growth of annual weeds and succulent sprouts for use by livestock in midsummer and fall. Sometimes the burning did improve the forage, but the improvement was only temporary and the forage was seldom as abundant or as palatable as hoped for.



Illustration 6. Hillside where Douglas fir had been girdled and burned to develop grass rangeland. Note that grass has not provided enough cover to protect the hillside from destructive erosion. When trees grow on these hillsides the soil does not erode. Sonoma County, California. Note also Illustration 5, page 10.

The influence of annual "light" burning on reproduction of Ponderosa pines is shown in Illustration 4.

In Sonoma County, the competition between range and forest for use of the land caused an era of tree girdling and land clearing with the use of fire, particularly in the Douglas fir timber types. At first, nearly all land clearing and tree girdling jobs seemed to be successful. Weeds, annual grass and tender sprouts sprung up like magic on slashed and burned forest land, but the assumed benefits of girdling and burning were short-lived on most areas. Before nature could establish a stable cover on wholly cleared lands, the rains of a few winters sluiced away too much of the thin topsoil. Galled spots, land slips and gullies appeared. On warm slopes, the cover was reduced to an ever-thinning sparseness of short-lived annuals. Other areas reverted to dense thickets of blue blossom, baccharis, or tan oak or were claimed by bracken fern. Along the coast, forest and brush land that was cleared for range, nearly always came back to dense brush. The results of girdling and burning in Sonoma County are shown in Illustrations 5 and 6.

Lack of ready markets is one of the major problems in disposing of all products from woodlands. This is particularly true for those items which are



Illustration 7. Good land use at Garden Valley in El Dorado County, California. Pasture and orchards on the better lands in the foreground and woodland on the rough ridge in the background.

not normally in constant demand, and which in this report will be termed "special products." Sawlogs have a ready market. Veneer blocks, fuelwood and fence posts have a reasonably constant market. But items like piling, poles, mine timbers and many others are, in most cases, special products. They can be disposed of only in limited amounts to special buyers at certain times. Part of the farm forestry program was to direct cooperators to established markets, or special markets in some cases, to advise on prices and assist in establishing and interpreting specifications for wood products. The average farmer's uncertainty about market demand, location, prices and specifications for his wood products and his lack of bargaining power because of small volumes, make it desirable that specialized assistance be available to the small woodland owner. There are two very important reasons for this: (1) The owner needs to get an adequate return from the land producing a woods crop so he will continue to use his land for the purpose to which it is best adapted; and (2) the Nation needs the wood products now and will need them in the future. By good grading and marketing practices, greater utilization can be made of trees cut, and higher quality products can be grown for future use.

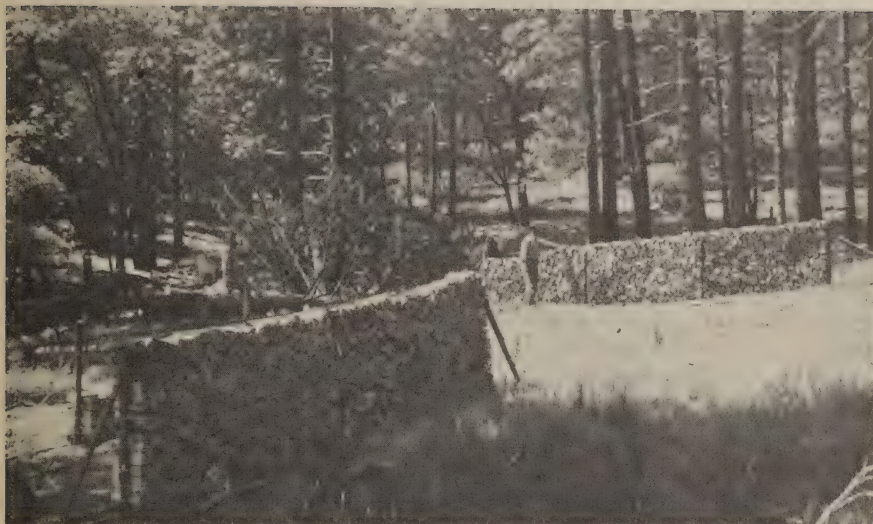


Illustration 8. Pine fuelwood cut from scarred and diseased trees that were not good for sawlogs on the Hartwick farm, El Dorado County, California. Part of Mr. Hartwick's 200 acres, "Iowa Creek Tree Farm," with good crop trees on it, is shown in the background.

The best possible land-use for every acre of every farm is the underlying principle that motivates the soil conservation program. This principle was applied in the farm forestry projects by the preparation of individual farm plans, in which it is recommended that each acre be treated according to its capabilities. Farms were selected from the standpoint of their value in demonstrating the role the farm woodland can play in the business of farming. Farms chosen were representative of all classes of farms in the project in which farm woodland management could influence farm economy. In selecting farms for such demonstrations, consideration was given to three important elements—(1) farmer, (2) land, and (3) woods. An effective program of woodland management is not possible without the proper combination of these three elements.

The farm plans, for all the land and the woods, were developed by a technician in consultation with the owner or operator. These plans consisted of an inventory of the soils, crops, forage and timber resources; a recognition of the capabilities of the land and recommendation for its best use whether it be woodland, pasture or cropland; and a selection of the protective or improvement practices needed for each field or pasture, crop or woodland. (An example of good land-use is shown in Illustration 7.) The recommendations often included field reorganization and cross-fencing when needed, the application of many well known, good farming practices for pasture, range or cropland, and the outlining of a woodland management plan. This included advice on when to harvest, what type and sizes of trees to cut, what

type of products could be harvested, and quantity that could be taken. In execution of the plan, it often involved assistance in preparing sales contracts, cruising of timber and the marking of trees to be cut. Originally, it was intended to keep records of the cash and non-cash outlay by the farmer and of the cash and non-cash income of the woodland. Even though project foresters often gave assistance in keeping these records, many were not completed. A few can be presented as examples of accomplishments in the following pages.

The project forester also gave assistance to farmers who did not have detailed farm plans for all parts of the farm. The assistance was chiefly locating harvestable materials, getting buyer and seller together, and furnishing contract forms having good forest practice provisions. This activity was in conformance with helping the war effort which called for the greatest possible amount of woods products. There was not the opportunity to give needed attention to best long-time use of all land operated by farmers assisted in this way. Additional efforts should now be made to get a complete, coordinated land-use and farm labor program developed for these farmers. This marketing assistance represents a good start in educating owners about the values of their woods crop. Now they need help in developing a plan for continuous yield according to the abilities of their own labor, the woods and their land.

ACCOMPLISHMENTS

Accomplishments of the farm forestry projects might be measured several ways. Examples are: Numbers of cooperators, the volume and kind of products harvested for home use or sale, the other types of conservation work done by the cooperating farmers, and the recognition for achievement bestowed on the farmers.

Before a farmer can be much interested in growing a woods crop, he wants to know what it will mean to him in dollars and cents. He is not impressed by forestry terms nor interested in practicing silviculture. He wants to know about what and how much he has, where and for how much he can sell it. Therefore, it was often necessary to do many things for a farmer before he could see his advantages—markets were located, specifications for products were explained, woodlands were cruised, trees were marked, roads were located, advice given on sale contracts. These jobs for farmers required considerable time, for they were not just tasks to be performed. The farmer had to see the relationship they had to his business; farm forestry is both a technical and an educational program.

The number of farm plans prepared and acres of land involved are indicated in the following tabulation:

	Sonoma County	El Dorado County
Number farm forestry plans prepared	49	56
Acres of woodland in above farms	11,695	9,271
Total acres in above farms	34,360	17,779

In addition to those for whom complete farm plans were developed, there were many requests for assistance in harvesting and marketing woods products,

and tree planting. Of these, some 60 received considerable field assistance and 30 of these harvested products in accord with advice given.

About 30 different products were harvested from cooperators' farm woodlands and sold or used at home in place of material that otherwise would have had to be purchased. Some products, such as sawlogs and piling which required heavy equipment to handle, were sold as stumpage. The more highly processed items, as posts, shingles and pickets, required more labor but yielded greater returns to the farmer. A listing of the products and the quantity harvested at each project are given in the following tabulation. Production per farm is given later, under examples.

WOODLAND PRODUCTS HARVESTED OR PRODUCED BY COOPERATORS

Product	Unit	Sonoma County	El Dorado County	Total
Saw timber	MBF	1,635	3,952	5,589
Veneer bolts	MBF	-----	524	524
Piling, spars and poles	L.F.	41,128	278,695	319,823
Mine timbers	L.F.	-----	17,500	17,500
Building timbers	L.F.	-----	15,946	15,946
Hazard training timbers	L.F.	-----	3,700	3,700
Rustic poles	L.F.	1,833	-----	1,833
Small peeled poles	L.F.	6,260	-----	6,260
Rough poles	L.F.	735	-----	735
Fuelwood	Cord	1,653	2,926	4,579
Posts	Each	35,760	7,558	43,318
Shingles and shakes	Square	145	33	178
Pickets	Each	30,380	-----	30,380
Stepping blocks	Each	923	-----	923
Hewn timbers	Each	28	-----	28
Oyster poles	Each	910	-----	910
Railroad ties	Each	6,085	-----	6,085
Deadman	Each	80	-----	80
Christmas trees	Each	14	375	389
Christmas tree bases	Each	132	-----	132
Christmas berries	Lbs.	-----	4,925	4,925
Hop stick material	Cord	35	-----	35
Tanbark	Cord	134	-----	134
Redwood bark	Cord	12	-----	12
Pulpwood	Cord	100	-----	100
Leafmold	Cu.yd.	2	-----	2
Oak sawdust	Sack	51	-----	51

The complete farm conservation plans included specific recommendations for the management of the farm woods as a crop on a continuous production basis. Practices suggested to a farmer depended on his woods, and his desires and abilities to do work in the woods. Most woods work would fall under the following practices: harvest cutting, improvement cutting, thinning, fire protection and prevention of grazing damage. A primary objective was to improve growth conditions so that "crop trees" might produce the maximum quantity of high quality material in the shortest possible time. Other activities were significant as shown in the following tabulation:

Practice	Unit	Sonoma County	El Dorado County
Fire-breaks	Rods	736	2,698
Roads and trails	Rods	1,607	905
Fencing	Rods	655	-----
Cruising	Acres	1,679	5,436
Natural seeding	Acres	-----	2,790



Illustration 9. Fuelwood operations in black oak (*Q. Kelloggii*) woodland with coppice reproduction (sprouts from stumps) method being used for stand restoration, El Dorado Project

These projects were located in typical areas of the second-growth Ponderosa pine and second-growth redwood-Douglas fir woodland subdivisions of the State. Being in a natural forest region, volunteer reproduction following harvest of crop trees could be expected. Therefore, planting forest trees was not a major job facing the farmers. In each area, there were parcels of land, which were best suited to growing trees, that had been cleared in the past. These lands were often near enough to an existing seed source so that they could restock naturally. Some, however, were not so located and planting remains the only way to get a new crop of trees started.

Tree planting was done by six cooperators at El Dorado and two at Sonoma. The plantings made are shown by the following tabulation:

		Sonoma County	El Dorado County
Woodland plantings	Acres	606	11
	Trees	9,335	2,735
Windbreaks and borderstrips	Rods	253	.....
	Trees	4,620	.....

Appreciation of the importance and possibilities of woodland and its crops was increased by the work of the farm forestry projects. Evidence of this is shown in the number of El Dorado County farmers whose farms became certified as "tree farms" under the Western Pine Association Tree Farm Program. A "tree farm" is an area of privately-owned land of any size dedi-



Illustration 10. Fuelwood made from peeled tanbark oak. Tanbark oak trees usually are left to rot in the woods where they increase the fire hazard. Under favorable marketing conditions, tan oak can be sold profitably as fuel. Sonoma County, California.

cated to the growing of forest crops for commercial purposes and protected and managed for continuous production. Sixteen farmers followed practices to encourage continuous production of forest crops, so that they qualified and received recognition by having their farms certified as tree farms. A list of them follows:

WESTERN PINE TREE FARMS—EL DORADO COUNTY

H. E. Adams.....	Madrona Tree Farm.....	100 acres
S. A. Bivans.....	Deephaven Tree Farm.....	270 acres
C. A. Butterworth.....	Aubmur Tree Farm.....	211 acres
W. A. Caldwell.....	Caldwell Tree Farm.....	98 acres
J. W. Caswell.....	Keystone Tree Farm.....	53 acres
W. C. Cumming.....	Cumming Tree Farm.....	84 acres
H. E. Gatlin.....	Cedar Knoll Tree Farm.....	23 acres
Fred S. Hannaford.....	Hannaford Tree Farm.....	224 acres
C. M. Hickman.....	Hickman Tree Farm.....	553 acres
Philip Hartwick.....	Iowa Creek Tree Farm.....	200 acres
Mrs. A. L. Howard.....	Fort Jim Tree Farm.....	80 acres
Steve Raty.....	Traverse Creek Tree Farm.....	85 acres
R. O. Rivard.....	Rivard Tree Farm.....	45 acres
Mrs. C. Belle Swansborough.....	Mosquito Tree Farm.....	62 acres
Geo. H. Volz.....	Volz Tree Farm.....	375 acres
Allan Barnes.....	Pine Hills Tree Farm.....	233 acres



Illustration 11. Harvesting piling on Mr. Water's farm woodland in El Dorado County, California. Trees suitable for sawlogs were marked and reserved. Piling yield was about 400 lineal feet per acre and net income about \$6 per acre in sale. Other woodland products were also harvested from the same area. See story of Mr. Waters' farm among examples, page 24.



Illustration 12. Loading second-growth Ponderosa pine veneer blocks on Mr. Barnes' "Pine Hill Tree Farm" in El Dorado County, California, for the H. P. Thornton Veneer Cover Company. The blocks are clear sections cut between limb whorls of 50-year old pines. The sections containing the knotty whorls are used for fuel.



Illustration 13. Piles of split redwood fence posts "yarded out" along road on Miss Laton's "Joy Woods Farm" in Sonoma County, California. This was the first tree farm in the Redwood Empire. See also story of Miss Laton's farm under examples, page 27.



Illustration 14. Loading Douglas fir piling from Miss Laton's "Joy Woods Farm" in Sonoma County, California



Illustration 15. Eucalyptus plantation with fuelwood operation in foreground and young-growth from coppice reproduction (sprouts from stumps) and tall trees in background



Illustration 16. Cleaning up tree tops for fuelwood following sawlog operation on Mrs. Howard's "Fort Jim Tree Farm" in El Dorado County, California. This fuelwood operation helped to dispose of slash after cutting sawlogs.

EXAMPLES OF BENEFITS FROM FARM WOODS

Mrs. Howard of El Dorado received aid in getting full value for the harvestable products from the "Fort Jim Tree Farm." She had been offered a "lump sum" of \$625 for all of her timber. After a cruise was made, she got a bid of \$3 per thousand. Since about 700,000 board feet of timber were ready for cutting, Mrs. Howard received about \$1,500 more by selling on inventory rather than in a lump sum.

Returns for labor in harvesting woodland products are oft-times higher than from other farm work. In 1944, Mrs. Coen and daughter of El Dorado County made 75 cents per hour leisurely picking 324 pounds of Christmas berries (Toyon) and selling them at 5½ cents per pound in Sacramento. Mr. Mathews earned \$1.62 per hour for his labor in splitting 1,250 cedar posts in 116 hours, and selling them on his place at 20 cents each.

Listed below are a few specific examples of immediate benefits received by farmers who were cooperators in the farm forestry program.

EL DORADO COUNTY

1. Mr. Eberhardt

Size of farm—160 acres.

Type of farm enterprise—Poultry farm with woodland.

Woodland—140 acres, mostly Ponderosa pine of uneven age and black oak.

Woodland management plan—Liquidation of all old-growth over a period of 10 years, encouraging young-growth by fire protection, improvement cutting and by leaving seed trees.

Products harvested (1943):

Pine fuelwood	125 tiers	\$375.00
Oak fuelwood	165 tiers	637.50
Pine lumber	5 m.b.m.	170.00
Oak lumber	400 bd. ft.	20.00
Christmas trees	9 each	9.00
Structural timbers	90 l. ft.	7.20
Total received for wood products		\$1,218.70
Expense cash outlay (gas, oil, repairs)		277.10
Returns for 1,316 hours labor plus truck and saw use		\$941.10
Return per hour of labor		\$0.72

NOTE: Much of lumber used on home chicken farm, labor of two teen-age boys included in the 1,316 hours.

Products harvested (1944):

Pine fuelwood	35	cords	\$427.00
Oak fuelwood	18½	cords	382.00
Christmas trees	57	each	62.00
Veneer bolts	126,848	bd. ft.	3,044.52

 \$3,915.52

Expenses

Stumpage	\$427.27	
Gas, oil and repairs	542.27	
Interest and depreciation	144.15	1,128.69

Returns for 2,363 hours family labor	\$2,786.83
Return per hour of labor	\$1.18

NOTE: About 168 hours of the labor were spent on slash disposal and road maintenance, veneer bolts were hauled about 65 miles.

2. Mr. Waters

Size of farm—200 acres.

Woodland—97 acres, of which about 76 acres were 80-year old Ponderosa pine.

Woodland management plan—Improvement cuttings.

Products harvested (1942):

Piling	30,000	l. ft.	\$450.00
Veneer bolts	20,000	bd. ft.	60.00
Pine fuelwood	20	tiers	70.00

 \$580.00

Products harvested (1943):

Pine fuelwood	20	tiers	\$60.00
Oak fuelwood	10	tiers	40.00
Other fuel	10	cords	13.50
Lumber	2,500	bd. ft.	112.50
Sheathing	1,000	bd. ft.	45.00
Shingles	32	bundles	64.00
Structural timbers	600	l. ft.	15.00
Christmas berries	500	lbs.	12.50

 Total \$362.50

Expenses

Gas and oil	\$30.00	
Stumpage	36.00	
Tractor and saw depreciation	48.00	114.00

Returns for 392 hours of labor	\$248.50
Return per hour of labor	\$0.635

NOTE: Including the 40 hours used in slash disposal and time used in experimental work with new Belsaw mill.

3. Mr. Barnes

Size of farm—321 acres.

Woodland—233 acres, mostly Ponderosa pine, 80 acres of old-growth, 70 acres of 80-year-old, and 83 acres of 50-year-old trees. Annual growth estimated over 80,000 bd. ft. of pine and 22 cords of hardwoods.

Woodland management plan—Liquidation of old-growth timber and improvement cutting in remainder, harvesting when prices are favorable.

Products harvested (1943):

Piling	13,365 l. ft.	\$386.92
Pine fuelwood	30 tiers	120.00
		<hr/>
		\$506.92
Cash expense		2.50
		<hr/>
Returns for 354 hours of labor		\$504.42
Return per hour of labor		\$1.42

NOTE: The farmer cut 6,215 l. ft. of piling and the remainder was cut by a contractor.

Products harvested (1944):

Veneer bolts	54 m. b. m.	\$810.00
Pine fuelwood	30 cords	324.00
		<hr/>
		\$1,134.00
Expenses		
Stumpage	\$162.00	
Other	67.00	\$229.00
		<hr/>
Returns for 1,234 hours of labor		\$905.00
Return per hour of labor		\$0.733

NOTE: The veneer bolts were harvested mostly from scattered, limby trees over 20 inches diameter in the 50-year-old area. The fuelwood was cut mostly from the tops and dead trees, some from improvement cuttings.

SONOMA COUNTY

1. *The MacMurray Farm*

Size of farm—808 acres.

Type of farm enterprise—Livestock and fruit farm run by manager.

Woodland—557 acres, of which about 225 acres are principally low quality hardwoods and about 140 acres of second-growth redwood and Douglas fir, with the remaining 192 acres being principally valuable for watershed.

Woodland management plan—Cut all products needed in the operation and maintenance of the ranch in the manner that will improve composition and quality of woodland.

Products harvested for home use (1942):

Redwood posts	1,500 each	\$375.00
Gate posts	100 each	100.00
Hewn timbers	806 l. ft.	387.64
Redwood logs	5 m. b. m.	75.00
Douglas fir logs	14 m. b. m.	168.00
Fir poles	1,500 l. ft.	300.00
		<hr/>
		\$1,405.64
Cash expenses, labor and equipment		621.00
		<hr/>
Returns from farm woods		\$784.64

NOTE: Labor included road building and slash disposal.

Products harvested (1943):

Posts and bridge timbers.....	\$602.00
Labor and equipment costs.....	340.00
Returns from farm woods.....	\$262.00

NOTE: Labor included road building, but no slash disposal.

Products harvested (1944):

Fence posts	950 each	\$475.00
Gate posts	100 each	150.00
Hewn timber	8 each	98.00
Piling	280 l. ft.	50.40
Poles	5,310 l. ft.	318.60
Corral poles	950 l. ft.	22.50

Labor expenses	\$1,114.50
	838.00

Returns from farm woods.....	\$276.50
Total returns for three-year period from farm woods.....	\$1,323.14

NOTE: All products used on farm and supplied materials for building corrals, remodeling barns, piling for reinforcing wing walls on irrigation dams, also bridge and splash-board timbers, used in constructing dams.

2. Mr. Nelson's Farm

Size of farm—28.5 acres.

Type of farm enterprise—Poultry farm.

Woodland—15.2 acres, blue gum (*Eucalyptus globulus*) plantation

Woodland management plan—Clearcutting in blocks on a 20-year rotation, with coppice system of stand reproduction.

Products harvested (1942):

Fuelwood (sold)	\$824.12
Fuelwood (used)	72.80
Oyster poles	910 each 18.00

Expenses: Hired labor, gas and oil.....	\$914.92
	433.02

Returns for 1,236 hours farm labor and 22 hours use of truck and tractor	\$481.90
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NOTE: Returns were over \$3 per hour for the labor and truck use put in by the farmer and 56 tiers of fuelwood were unsold at end of season.

Products harvested (1943):

Fuelwood sales amounted to \$188, of which about two-thirds was carry-over of the previous season's unsold wood.

3. *The Laton Farm*

Size of farm—1,000 acres.

Type of farm enterprise—Managed woodland and some livestock on non-wooded areas.

Woodland—852 acres, virgin and second-growth redwood, with Douglas fir and associated hardwoods.

Woodland management plan—Harvest old-growth redwood over a 20-year period; make intermediate harvest cuts of second-growth redwood and Douglas fir, and remove merchantable hardwoods.

Products harvested and sold (1942):

Fuelwood	124 tier	\$384.00
Pulpwood	50 cords	487.50
Piling	5,788 l. ft.	2,053.01
Sawlogs	649 m. b. m.	7,568.25
Tanbark	6.8 cords	108.48
Redwood rustic bark	7.75 cords	124.00
Bridge timbers	200 l. ft.	90.00
Piling, Douglas fir	166 l. ft.	26.56
Pier blocks		19.35
Cribbing redwood	6,554 l. ft.	1,719.70
Cordwood, oak	57 cords	333.00
Cordwood, Douglas fir	41 cords	246.00
Shakes, redwood	4,000 each	111.35
Pickets and stakes	4,050 each	182.25
Posts, redwood	2,062 each	515.50
		<hr/>
		\$13,968.95
Expenses (hired labor)		10,249.58
		<hr/>
Net returns from woodland		\$3,719.37

NOTE: Road repair, bridge building, fencing, insurance and management are included in the expense items.

Products harvested (1943):

Sawlogs	461,391 bd. ft.	\$8,842.66
Cordwood	265 cords	3,869.21
Piling	7,366 l. ft.	2,654.66
Tanbark oak	11.4 cords	239.32
Stepping blocks	25 each	3.75
Fence posts	5,380 each	1,272.26
Pickets and stakes	4,132 each	193.04
Shakes	6,375 each	151.71
Pulpwood	100 cords	864.01
Redwood rustic bark	31 $\frac{1}{3}$ cords	50.00
Hopsticks	$\frac{1}{4}$ cord	1.00
Christmas trees	14 each	4.25
Pier blocks	129 cu. ft.	19.36
		<hr/>
		\$18,165.22
Expenses		\$13,940.92
		<hr/>
Net returns from woodland		\$4,224.30

NOTE: Expenses included labor, road construction, fencing, manager's salary and general overhead.

4. *The Hunt Farm*

Size of farm—264 acres.

Type of farm enterprise—Absentee-owner—hired woodland operations.

Woodland—Eucalyptus planting, 45 years old. Less than one acre in this story.

Woodland management plan—Clearcut.

Products harvested and sold (1943):

Fuelwood	864 tiers	\$3,073.37
Expenses (hired labor and tools)		2,210.99

Net returns from woodland		\$862.38
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NOTE: Average annual growth rate of the Eucalyptus woodland was more than 19 tiers of fuelwood per acre.

Average annual income rate was in excess of \$19 per acre.

5. *The Richardson Farm*

Size of farm—3,900 acres.

Type of farm enterprise—Livestock.

Woodland—850 acres.

Woodland management plan—Intermediate harvest and improvement cuttings.

Products harvested (1945):

Douglas fir piling	2,516 l. ft.	\$880.00
Expenses: Hired labor, hauling, agent's fees		540.94

Returns for stumpage and farm labor		\$339.60
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Stumpage at 4 cents per l. ft.		\$100.64
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Net returns to farmer		\$239.02
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NOTE: Farmer sold piling at roadside through timber agent.

APPENDIX

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TABLE I. AVERAGE RATES* EARNED BY WOODLAND OWNERS IN
PROCESSING WOODLAND PRODUCTS
El Dorado County, California, 1940-1945

<i>Process</i>	<i>Rate/Unit</i>	<i>Rate/Hour</i>
Logs and lumber		
Falling, limbing and bucking logs.....	\$2.75 m. b. m.	\$1.25
Stumpage to piled lumber.....	26.00 m. b. m.	1.17
(Based on 2 Belsaw mills)		
Piling		
Stumpage to loaded piling.....	0.04 l. ft.	1.36
Falling and peeling.....	0.03 l. ft.	1.38
Skidding.....	0.005 l. ft.	1.5C
Loading.....	0.005 l. ft.	1.11
Veneer bolts (second-growth)		
Falling, bucking and loading.....	12.00 m.	0.60
Veneer bolts (old-growth)		
Falling and bucking.....	8.00 m.	1.05
Stumpage to mill.....	17.40 m.	2.15
Poles		
Stumpage to loaded poles.....	0.04 l. ft.	1.51
Falling and peeling.....	0.03 l. ft.	1.60
Skidding.....	0.005 l. ft.	1.50
Loading.....	0.005 l. ft.	1.00
Mine timber (1940)		
Falling and peeling.....	0.02 l. ft.	0.60
Stumpage to mine.....	0.045 l. ft.	
Posts—cedar		
Falling, bucking and splitting.....	0.25 each	1.75
Posts—treated round—on farm		
Osmoplastic.....	0.09 each	0.50
Permatol—cold soaked.....	0.19 each	0.71
Fuelwood—Stumpage to market		
Pine bodywood and limbs.....	8.99 cord	0.66
Pine tops and limbs.....	11.87 cord	0.93
Black oak—all types.....	13.26 cord	0.70

* These rates include returns for labor and management. Interest, depreciation, operating costs and going stumpage rates have been deducted.

TABLE II. USUAL FARM STUMPAGE VALUE OF WOODLAND PRODUCTS

El Dorado County, California, 1940-1945

Sawtimber	\$3.00 m.
Pine piling .....	.015 l. ft.
Fir piling .....	.02 l. ft.
Veneer bolts (second-growth)	2.00 m.
Veneer bolts (old-growth)	3.00 m.
Poles .....	.01 l. ft.
Mine timbers .....	.005 to .03 l. ft.
Posts—heart cedar .....	.05 each
Posts—round .....	.03 each
Pine fuelwood	1.00 cord
Oak fuelwood	1.50 cord
Pine tops and limbs .....	.00

TABLE III. TOTAL STUMPAGE, LABOR AND MANAGEMENT VALUES OF ALL PRODUCTS HARVESTED BY TYPE I COOPERATORS

El Dorado County, California, 1940-1945

<i>Product</i>	<i>Unit</i>	<i>Total</i>	<i>Stumpage value</i>	<i>Labor and management value</i>	<i>Remarks</i>
Saw timber	m. b. m.	3,940	\$9,570	\$102,440	Rough, stacked Mill-run on farms
Fuelwood	cord	2,811	3,749	33,272	$\frac{2}{3}$ delivered to local users— $\frac{1}{3}$ on farms
Veneer bolts	m. b. m.	523	1,369	8,891	Delivered to mills near Sacramento
Piling and poles	l. ft.	209,545	3,343	8,382	Loaded on trucks at farms
Mine timbers	l. ft.	17,500	180	787	Delivered to local mines
Building timbers	l. ft.	15,946	79	319	Ready to use on farms
Posts	each	7,048	312	1,427	Ready to use on farms
Christmas trees	each	375	40	281	Delivered to local markets
Christmas berries	lbs.	4,925	25	148	Delivered to Sacramento
Shingles and shakes	squares	33	5	65	Delivered to local markets
Totals			\$18,672	\$156,012	

Labor and management values show returns to farmers under fullest logical processing.

TABLE IV. USUAL FARM STUMPAGE VALUE AND VALUE ADDED BY LABOR IN FULLEST LOGICAL FARM PROCESSING

Sonoma County, California, 1940-1945

Product	Unit	Stumpage return at farm	Added value of labor and profit of "processed" item	Remarks
Sawlogs (redwood)	m. b. m.	\$3.00	\$5.80	F.o.b. mill
Piling (redwood and Douglas fir) l. ft.		.02	.25	Delivered job
Fuelwood (oak)	cord	2.00	8.50	F.o.b. woods
Posts (split redwood)	each	.04	.33	F.o.b. woods
Pickets (split redwood)	m. pcs.	5.68	79.14	F.o.b. woods
Shakes	m. pcs.	1.72	36.33	Av. of 2-ft. and 3-ft.
Tanbark	cords	8.00	20.12	F.o.b. tannery
Pulpwood (redwood)	cords	1.00	4.14	F.o.b. city (1942)
Hewn redwood timbers	each	1.00	8.00	(1943)
Pier blocks (redwood)	cu. ft.	.03	.14	(1942)
Christmas trees	each	.10	.25	F.o.b. woods
Oyster poles (blue gum)	each	.005	.08	Delivered (1942)
RR ties (split redwood)	each	.09	.97	F.o.b. woods
Redwood bark	cord	1.00	14.00	Delivered
Rustic redwood poles	each	.005	.10	F.o.b. woods
Hopstick material (redwood)	cord	1.00	9.21	F.o.b. woods
Peeled Douglas fir poles	each	.01	.12	
Deadmen (redwood)	each	.12	2.50	F.o.b. woods
Poles (Douglas fir rustic)	each	.005	.10	F.o.b. woods
Sawdust (oak)	sack	.00	.50	Delivered

NOTES ON FARM FORESTRY PRACTICES—Sonoma County, California

1. *Cutting in old-growth redwood*

Cutting of old-growth redwood on farms does not require marking of trees for silvicultural purposes because all merchantable trees on the unit are taken. Where tractor logging is done, most of the trees not harvested escape damage. There are two problems: (1) How to get the trees down and the products out with the least possible breakage and waste, and (2) how to burn slash with the least possible damage to remaining trees.

Breakage can be reduced by careful falling, and the avoidance, in the farm woods, of highball logging. Small mills, who cater to farm trade, will often take rough logs and knotty logs. Split product operations on the farm usually permit a thorough clean-up since the stuff that is ordinarily culled can be sold f.o.b. the woods. Often cull sawlogs can be made into split products, and on farms it is sometimes possible to work into fuelwood some or all of the tanbark and pepperwood broken or damaged by the fallers. It may also be desirable to "jayhawk" tanbark and yard out the bark a season or so before falling old-growth, or the tanbarks may be felled and peeled when the resulting stumps and lack of bedding trees do not interfere with falling.

Disposal of deep slash accumulations is necessary in order to create a more favorable seedbed and to reduce the hazard of a disastrous fire in subsequent reproduction. Where slash is too deep and heavy to pile and burn, it must be broadcast-burned. This has been accomplished with fair success by: (1) Selecting a time to burn when slash is consumed relatively slowly and only the smaller material is wholly consumed; (2) burning downhill, setting a little at a time; (3) avoiding deep accumulation of slash and cull logs around base of residual trees, and where necessary using bull-dozer to remove such accumulations. A fourth method should be considered in planning harvest operations, that is, distributing the cut over a period of two or three years and burning slash each fall. This is desirable in split products operations and in logging old-growth redwood in farm woods.

2. *Harvesting second-growth redwood and Douglas fir*

Second-growth redwood and young Douglas fir, although even-aged, has the appearance of a selection forest. Redwood second-growth, which is mainly composed of stump sprouts, has all of the crown-dominance classes in each single clump, which is actually a miniature selection unit. Each unit may contain three to more than a dozen stems from which to select trees according to quality, size and dominance. Trees should be removed from the understory of the clump and leave the dominants for future harvest as sawlogs. Residual trees show a very noticeable increase in growth rate. Because of the crowding of stems in redwood second-growth clumps, it is sometime difficult to remove the particular stems that should be removed.

The Douglas fir timber in the farm forestry project is less than 100 years old. Large stands of nearly even-aged Douglas fir were seeded in, 80 years or more ago, under thin stands of old hardwoods and Douglas fir veterans. In this locality, Douglas fir appears cyclic with hardwoods, the dominant tree during part of the rotation. Silviculture practices should be followed which will insure quick reestablishment of Douglas fir after harvest. The crown canopy of Douglas fir should be maintained by avoiding heavy thinnings which open up the canopy to the point that rapid growth of the hardwood underbrush is stimulated. Light thinnings for piling and sawlogs can be made while the stand is approaching maturity, but the final crop should be clearcut in small blocks or strips, with provisions for seed trees, followed promptly by slash disposal. Under present conditions, an 80-year rotation in Douglas fir and redwood is indicated.

3. *Cutting practices and management of Eucalyptus plantations*

Blue gum, since it can be regenerated by coppice, is easily managed. On average sites, it will yield three or four cords of wood per acre per year. Locally, a 20-year rotation is recommended. A woodlot of several acres is divided into five to 20 units to be harvested annually or periodically so that an even-aged plantation is converted to a stand of even-aged groups of uneven ages. Thus the farmer can cut on an established rotation in an orderly manner and the shortened rotation increases yield by making a cut at the time the mean-annual increment begins to fall off. The smaller 20-year-old trees are easier for the farmer to handle.

In harvesting blue gum, stumps must be low in order to get firmly-seated sprouts. The sprouts must be thinned to one or two per stump about three years after cutting. Slash should be piled and burned.

VOLUME OF TREES AND STANDS—Sonoma County, California

1. Volume Tables

The following local volume tables have been prepared and used on the Sonoma Farm Forestry Project.

REDWOOD OLD-GROWTH

D. O. B. 20 ft.	Height,* feet	Double bark, thickness	Spaulding volume, bd. ft.
26		5	750
28			101
30	79	6	130
32			1,590
34			201
36			227
38			264
40	97	8	305
42			3,450
44			393
46			444
48			495
50	109	9	546
52			6,030
54			663
56			727
58			789
60	117	10	852
62			9,170
64			994
66			1,068
68			1,144
70	123		1,223
72			13,050
74			1,377

REDWOOD SECOND-GROWTH

D. B. H., inches	Volume		Height, feet
	Bd. ft.	Cords	
6		.03	36
8	15	.06	43
10	31	.105	50
12	58	.168	57
14	99	.246	63
16	144	.338	68
18	203	.446	73
20	272	.570	77
22	348	.692	80
24	437	.843	83
26	528	.996	85
28	643	1.18	88
30	760	1.37	90
32	915	1.61	93
34	1,080	1.89	96
36	1,270	2.20	99
38	1,480	2.53	102
40	1,700	2.86	105

Prepared by Mors, August 1940. 1.5' stump; 5" D. I. B. at top. Trees scaled Inter. Rule $\frac{1}{8}$ " kerf in 16.3' logs. 1 cord equals 90 cu. ft.

* Merchantable height to a diameter i. b. 60% of the 20' diameter i. b. (Prepared from volume tables for old-growth redwood by Wm. Hallin, USFS.)

VOLUME—DOUGLAS FIR

D. B. H., inches	Total av. ht., feet	Total, 16' logs No.	Scribner, volume, bd. ft.
12	64	1	57
14	71	2	104
16	78	3	163
18	85	3½	236
20	90	3½	311
22	95	4	393
24	98	4	476
26	101	4¼	568
28	104	4½	666
30	106	4½	760
32	108	4½	860
34	111	4¾	974
36	115	5	1,125
38	120	5	1,256
40	124	5	1,400
42	126	5	1,540
44	128	5	1,690
46	130	5¼	1,840
48	132	5¼	2,000
50	134	5¼	2,150
52	136	5¼	2,315

DOUGLAS FIR

D. B. H., inches	Volume		Height, feet
	Bd ft.	Cords	
8	4	.066	46
10	30	.124	55
12	70	.209	64
14	128	.310	71
16	203	.440	78
18	293	.599	85
20	384	.763	90
22	488	.954	95
24	600	1.13	98
26	715	1.34	101
28	856	1.59	104
30	988	1.81	106
32	1,132	2.07	108
34	1,292	2.36	111
36	1,480	2.67	115
38	1,700	3.03	120
40	1,990	3.44	125

Prepared by Mors, from Calif. Agri. Exp. Sta. Bul. No. 491. Stump height: 1'0". International Rule ½" kerf. 16' logs to a 5" top d. i. b.

Prepared from Tech. Bul. 201. USDA, Stump: 2 ft.; top 8" d. i. b.

VOLUME—HARDWOODS

D. B. H., inches	Volume		Height, feet
	Cu. ft.	Cords	
4	1.53	.017	24
5	2.52	.028	
6	3.51	.039	30
7	4.95	.055	
8	6.39	.071	35
9	8.19	.091	
10	9.90	.110	40
11	13.0	.145	
12	16.2	.180	44
13	20.2	.225	
14	24.2	.269	48
15	29.6	.329	
16	35.1	.390	51

D. B. H., inches	Volume		Height, feet
	Cu. ft.	Cords	
17	41.8	.465	
18	48.6	.540	54
19	56.9	.632	
20	65.2	.725	57
21	75.8	.842	
22	86.4	.960	60
23	96.3	1.07	
24	106.2	1.18	63
25	116.1	1.29	
26	126.1	1.40	66
27	135.9	1.51	
28	145.8	1.62	68
29	155.7	1.73	
30	166.5	1.85	70

2. Average volume in representative stands

While it is impossible to describe or identify "average" stands, the following information on the volume in Sonoma County stands has been helpful in making estimates of volumes on uncruised farm forests:

Douglas fir—Russian River Drainage

"Old-growth" on north slopes

D. b. h.— 6"-12"	690 lin. ft.
D. b. h.—14"-20"	6,430 bd. ft. Inter. 1/8" rule
D. b. h.—22"-34"	20,125 bd. ft. Inter. 1/8" rule

Immature, average site

D. b. h.— 6"-12"	4,680 lin. ft.
D. b. h.—14"-20"	4,620 bd. ft. Inter. 1/8" rule
D. b. h.—22"-34"	9,560 bd. ft. Inter. 1/8" rule

Douglas fir—Gualala River Drainage

"Old-growth"

		Volume, Scribner	No. trees
D. b. h.—18"-40"	Merchantable	31,000 bd. ft.	52
	Cull	18,000 bd. ft.	28

Good sites

	D. b. h.	Volume, Scribner
Sound	18"-24"	10,600 bd. ft.
Sound	26"-plus	16,000 bd. ft.
Cull		11,400 bd. ft.

Average sites

	D. b. h.	Volume, Scribner
Sound	18"-24"	5,600 bd. ft.
Sound	26"-plus	13,000 bd. ft.
Cull		5,300 bd. ft.

Poor sites

	D. b. h.	Volume, Scribner
Sound	18"-24"	3,800 bd. ft.
Sound	26"-plus	8,600 bd. ft.
Cull		5,400 bd. ft.

Second-growth redwood

Average site; age class 80

D. b. h. range	12" to 40"
Sound redwood	15,000 bd. ft. Inter. 1/8" rule
Cull redwood	7,000 bd. ft. Inter. 1/8" rule
Hardwoods	13.3 cords

3. Conversion factors and miscellaneous information

Volume (Inter. 1/8" rule) per square foot of basal area

D. b. h. group	Redwood		Douglas fir		Hardwood
	Bd. ft.	Cords	Bd. ft.	Cords	Cords
6"-12"	55	.19	55*	.23	.21
14"-20"	112	.25	157	.33	.30
22"-28"	142	.27	193	.36	.37
30"-40"	178	.31	212	.38	

*or 147.4 lin. ft. of poles.

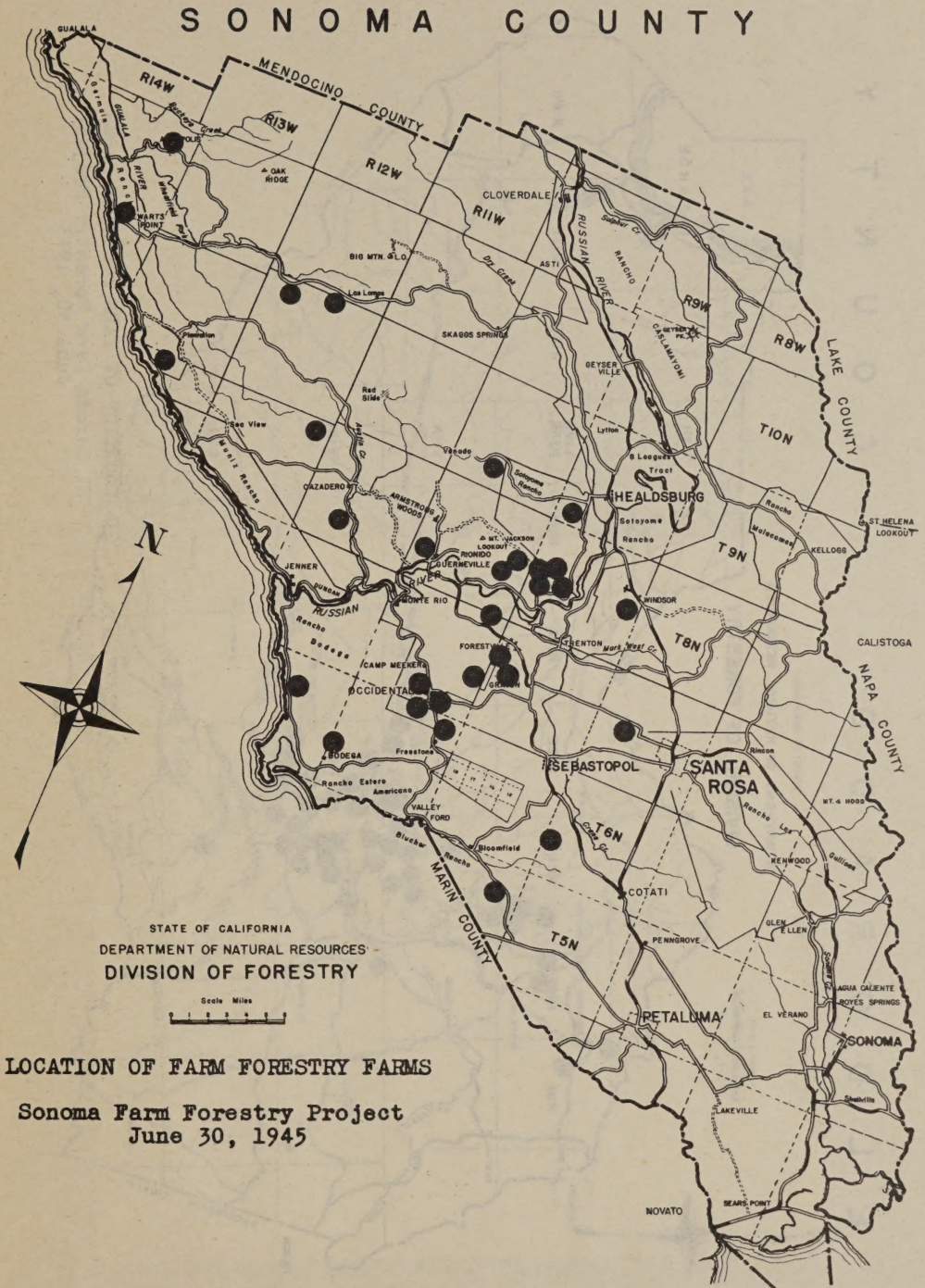
Tanbark—Average values

Cords of bark per sq. ft. of basal area .....	.079	cords
Basal area per cord of bark	12.7	sq. ft.
Average number of trees per cord of bark	7-8	trees
Fuelwood per sq. ft. of basal area .....	.28	cords
Basal area per cord of fuelwood made from peeled tanbark oak	3.6	sq. ft.
Ratio cords of bark to cords of fuel (4')	1.3	

(Data 249 trees, average d. b. h. 18.3")

4. *List of forest products available in Sonoma County*

- Bark*, redwood rustic.
- Berries*, huckleberries, blackberries.
- Bumper logs*, marine, Douglas fir.
- Burls*, living redwood.
- Burls*, novelty or veneer of redwood or laurel.
- Christmas trees*, Douglas fir.
- Cribbing*, redwood, round of halves.
- Fern roots*, various species.
- Fuelwood*, oak, madrone, laurel, bluegum, Douglas fir, manzanita.
- Greenery*, ferns, redwood sprays, toyon-berries.
- Hop poles*, Douglas fir, redwood, eucalyptus.
- Hop sticks*, redwood.
- Leafmould*, oak.
- Logs*, cabin, Douglas fir, redwood.
- Logs*, saw, Douglas fir, redwood, laurel, golden chinquapin, tanbark, oak and species of *Quercus*, alder, madrone, sugar pine, bishop pine, eucalyptus.
- Mine timbers*, Douglas fir.
- Oyster poles*, Eucalyptus.
- Piling*, Douglas fir, redwood, eucalyptus.
- Poles*, peeled, Douglas fir and redwood.
- Poles*, rustic, Douglas fir and redwood.
- Posts*, split redwood, Douglas fir and eucalyptus (treated).
- Pulpwood*, Douglas fir and redwood.
- Rustic display material*.
- Shakes*, split redwood.
- Stakes*, split redwood.
- Stepping blocks*, redwood.
- Tanbark*.
- Ties*, rail and switch, split redwood, sawn Douglas fir.
- Timbers*, hewn redwood and Douglas fir.
- Woodrat fertilizer*.



E L D O R A D O C O U N T Y

